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Real Interest Rates in Historical Perspective

by

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Abstract

Real interest rates in the industrialized countries have been significantly higher during the 1980s than during the previous three decades, leading many observers to conclude that the current level of real rates is an unusual phenomenon which will soon be reversed. This paper evaluates this view using a longer historical perspective, tracing movements in real interest rates over the past several centuries.

Data on real interest rates in a number of western countries covering the period from the 1500s to the present indicate that real rates have typically been highly volatile from one decade to the next. Changes in inflation have been the main factors influencing the real interest rate: large shifts in inflation are usually only partially offset by changes in nominal interest rates, and thus translate into movements in the real rate. In contrast to the substantial medium-term volatility of real interest rates, average rates varied little from one century to another prior to 1900. The real interest rate averaged between 4 and 5 per cent in each century between 1500 and 1900, a rate well above the real economic growth rate. The 20th century, however, represents a clear departure from this level, with real interest rates averaging less than three per cent among the industrial countries since 1900.

Any evaluation of whether current real interest rates are abnormally high thus depends crucially on the historical period chosen as benchmark: while recent real interest rates have high compared with those observed since 1900, they are not unprecedented, and indeed are well within the boundaries established over the past several centuries.

Résumé

Les taux d'intérêt réels des pays industrialisés ont été nettement plus élevés dans les annees 80 qu'au cours des trois décennies précédentes, ce qui a fait conclure à de nombreux observateurs que le niveau actuel des taux d'intérêt réels etait un phénomène inhabituel qui devrait se resorber sous peu. Ce document évalue ce point de vue à partir d'une perspective historique plus étendue, en retraçant l'evolution des taux d'intérêt réels au cours des derniers siècles.

Les données sur les taux d'intérêt réels de plusieurs pays de l'ouest depuis le 16e siècle indiquent que les taux d'intérêt réels ont, en général, beaucoup fluctué d'une décennie à l'autre. L'evolution de l'inflation a constitué le principal facteur influencant le taux d'intérêt réel: de fortes variations de l'inflation ne sont habituellement que compensées partiellement par des fluctuations de taux d'interêt nominaux, causant par le fait même des variations du taux d'intérêt réel. Contrairement à la fluctuation importante à moyen terme des taux d'intérêt réels, les taux ont été remarquablement constant au fil des siècles si on se limite à la période antérieure à 1900 . Le taux d'intérêt réel s'est établi en moyenne entre 4 et 5 pour cent au cours de chaque siècle compris entre 1500 et 1900, un taux bien supérieur au taux de croissance économique réel. Cependant, la tendance se modifie au 20e siècle, les taux d'intérêt réels s'établissant en moyenne à moins de 3 pour cent dans les pays industrialisés.

Toute évaluation visant à déterminer si les taux d'intérêt réels courants sont trop élevés est donc fonction dans une grande mesure de la période historique choisie. Même si les taux d'intérêt réels ont récemment été élevés comparativement à ceux qui ont été observés depuis 1900, ils ne sont pas sans précédent et, en fait, ils se comparent tout à fait aux valeurs observées au cours des derniers siècles.

TABLE OF CONTENTS

1. Introduction 1
2. European Interest Rates During the 16th and 17 Centuries 2
3. Interest Rate Developments during the 18th Century 4
4. Interest Rate Developments in the 19th Century 7
5. Interest Rates in the 20th Century 11
   5.1 Movements in the Risk-Free Rate 11
   5.2 The Term Structure of Interest Rates during the 20th Century 15
   5.3 Risk Premiums 17
   5.4 The Real Interest Rate and the Economic Growth Rate 20
6. Concluding Remarks 23

1. Introduction

Real interest rates in the industrialized countries have been significantly higher in the 1980s than in the previous three decades. Some observers, whose view of the 'normal' real interest rate is conditioned by developments during the post-war period, view the increase in real interest rates during the 1980s as an unusual and perverse event that is likely to be soon reversed. The purpose of this paper is to explore movements in real interest rates over the last several centuries, and thus provide a much longer historical perspective on these recent changes.

In tracing long-run trends in real interest rates, the following questions will receive special attention. First, do the historical data suggest a normal level for the world real interest rate with which to evaluate current rates? Second, to what extent have real interest rates been historically volatile, and how do current real interest rates compare with past deviations from average levels? Third, what is the response of interest rates to inflation? Fourth, have there been changes over time in the pattern of returns across assets with different terms to maturity and risk characteristics? Fifth, what is the historical relationship between the real interest rate on risk-free securities and the real economic growth rate?

Section 2 presents data on real interest rate movements during the 16th and 17th centuries, following the establishment of modern-style credit markets in a number of European countries. Section 3 describes trends in European real interest rates during the 1700s, while Section 4 discusses interest rate developments in the United States and Europe during the 19th century. Section 5 traces movements in the level and structure of world interest rates since 1900. Section 6 contains concluding remarks.

2. European Interest Rates During the 16th and 17 Centuries

Although data on nominal interest rates during the 16th and 17th centuries are available, the absence of detailed information on price-level movements complicates the construction of a reliable ex post real interest rate for this period.[1] Yet because the available evidence suggests that European prices were nearly stable during this period, real interest rates are approximated by nominal yields.[2] A sample of European interest rates during the late Renaissance period is shown in Table 1. Interest rates on relatively risk-free long-term loans, such as those negotiated by the most credit-worthy city governments or secured by land, averaged 5 per cent during the 1500s. Interest rates on short-term commercial loans averaged approximately 9 per cent, but varied widely depending on the reputation of the borrower. In particular, while interest rates were as low as 4 per cent on loans to established banking houses, most other enterprises faced short-term interest rates of at least 8 per cent. It is interesting to note that 16th century national governments were unable to borrow at low risk-free interest rates as they do today: interest rates on short-term loans to governments averaged 2 to 4 percentage points higher than the highest interest rate normally charged on short-term commercial loans. These high rates likely reflected the tendency of governments to default on their debts.

The rise of organized money and stock markets in the Netherlands during the 17th century was associated with a narrowing of the gap in continental Europe between interest rates on low-risk private mortgages and rates on more risky loans to governments and businesses. While the interest rate on mortgages, which perhaps is the best indicator of underlying trends in continental European interest rates, remained at the 5 per cent level of the previous century, there was a general decline in interest rates on riskier loans. The interest rate on long-term Dutch govern-

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[1] Throughout this paper, real interest rates are constructed by subtracting the average inflation rate over a given period from the period's average nominal interest rate.

[2] According to Sidney Homer, A History of Interest Rates, (New Brunswick, New Jersey: 1963), inflation in Northern Italy averaged approximately 1.3 per cent per year between 1550 and 1620. This inflation rate is regarded as being exceptionally high, and is attributed to localized expansions in the money supply associated with shipments of gold from Spanish colonies in the Americas to the Genoese creditors of the Spanish government. In areas other than those affected by the influx of gold, such as England, the prices of staples such as coal and wheat increased at a much slower rate: the price of English wheat rose at an average annual rate of only 0.6 per cent between 1500 and 1700, while coal prices increased by 0.4 per cent per year over the 1585-1700 period.

ment bonds, for example, fell from an average of 8 per cent in the 16th century to less than 4 per cent by 1700. The drop in short-term commercial interest rates was even larger than the fall in long-term government bond rates -- the interest rate on short-term loans to businesses declined from more than 10 per cent in the 1500s to less than 3 per cent by the end of the 16th century -- resulting in the emergence of a positively-sloped yield curve.

Interest rates on loans to governments were characterized by large and variable risk premiums. Although the 8 per cent interest rate paid on loans by the British government was considerably higher than the rate on private mortgages, the central and provincial governments of the Netherlands could obtain funds during the same period at the 3 per cent rate common for low-risk mortgages. The large difference between the risk premiums on British and Dutch government debt suggests the importance of financial intermediation in reducing not only the level of interest rates, but also the premium on high-risk loans.

Table 1

European Interest Rate Developments: 1500-1700

	1500-1600		1600-50		1650-1700	
Long-term Interest Rates (%)						
Governments	5-10	(Germany)	6-8	(Holland)	3-4	(Holland)
	10-14	(England)			8-12	(England)
Private Mortgages	10-14	(England)	10	(England)	4-6	
	5	(continent)	5	(continent)		
Short-Term Interest Rates (%)						
Governments	10-14		6-12	(England)	6-12	(England:1650-90)
			3-6	(England: 1690-99)		
Commercial Loans	4-10		6-8	(England)	2-4	(Holland)
			3-6	(England)		

Source: Sidney Homer, A History of Interest Rates, (New Brunswick, New Jersey: Rutgers University Press, 1963), pp. 120-21, 130-31.

In summary, the early Renaissance period was characterized by a constant interest rate of about 5 per cent on low-risk mortgages, large and variable risk premiums on government debt

and commercial loans, and a negatively-sloped yield curve. Yet by the beginning of the 18th century, after the emergence of modern-style financial intermediaries, the yield curve had acquired a positive slope and the gap between private mortgage rates and those on more risky loans had narrowed considerably.

3. Interest Rate Developments during the 18th Century

Our investigation of real interest rate developments in the 18th century is once again hampered by a lack of data on price-level movements. Furthermore, the available information on price level movements in Britain and Spain suggests that 18th century inflation was sufficiently high and variable to render nominal interest rates poor proxies for real rates in those countries for which data on inflation is unavailable. We thus restrict our attention to real interest rate movements in Britain, the only country for which data on both inflation and nominal interest rates exist.[3]

The long-term interest rate used in this section is the rate on British government bonds. Prior to 1751, these bonds were available with a variety of terms, ranging from the lifetime of the purchaser to perpetuity. In 1751, however, the outstanding stock of government debt was consolidated through the issue of 'consols' -- perpetual bonds providing a fixed nominal interest payment each year. Because the annual interest payment is fixed, changes in the market value of the bond translate directly into changes in its effective nominal interest rate. We have selected the Bank of England's Discount Rate as the representative short-term interest rate; unlike today's Bank Rate, which is a penalty rate charged on loans made through the central bank's role as lender of last resort, the Discount Rate in the 18th century was the interest rate at which the Bank of England would discount short-term commercial bills for its depositors. The inflation rate was calculated by taking the compound rate of change in an index of consumer-goods prices, composed chiefly of foodstuffs and clothing materials.[4] The real interest rate was obtained by sub-

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[3] Only limited data are available on nominal interest rate movements in Spain during the 18th century, since it was during this period that the Spanish financial structure was virtually destroyed by the Crown's repeated defaults on the national debt.

[4] The index is composed of contract prices paid by institutions for 33 commodities and thus can perhaps best be construed as indicating movements in wholesale prices.

tracting the average inflation rate from the average nominal interest rate prevailing over the given period.

As shown in Table 2, the establishment of the Bank of England in 1694 as the financial agent of the British government coincided with rapid declines in the nominal interest rate on government loans: the yield on long-term government bonds fell from approximately 10 per cent in the late 1600s to about 3 per cent by 1730, and remained at that level until the mid-1750s. The decline in nominal interest rates was matched by an equally large drop in real rates: the real yield on long-term government debt fell from about 9.5 per cent in the first decade of the century to 2.6 per cent in the 1730s. Real returns on government bonds fluctuated between 2.6 and 3.7 per cent during the 1730-90 period, as an upward trend in nominal interest rates was offset by increases in inflation. The real interest rate became negative during the 1790s, as a modest increase in nominal interest rates failed to keep pace with the exceptionally high inflation that followed the entry of Britain into a major war with France in 1793.

Although the interest rate on long-term loans to the British government had been significantly higher than that on loans to individuals and businesses during the 1600s, this pattern was reversed during the 18th century. Interest rates on mortgages typically exceeded rates on long-term government bonds, although the gap narrowed from more than 1 percentage point in the 1700-50 period to less than 1/4 percentage point by 1800. It is likely that the difference between interest rates on government bonds and on loans to individuals and businesses would have been greater in the absence of usury laws that imposed a ceiling on interest rates on loans to private individuals.[5]

Short-term interest rates were typically lower than long-term rates, such as yields on the perpetual consols of the British government, during the twenty years following the creation of the Bank of England: while the interest rate on long-term government bonds exceeded 8 per cent during most of the period from 1695 to 1715, short-term commercial loans were available from the Bank of England at rates as low as 3 per cent.[6] The decline of interest rates on long-term

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[5] The maximum interest rate on most private loans was lowered in 1714 from 6 per cent to 5 per cent and remained at this level until the usury laws were repealed in 1854. Government loans were exempt from these controls, however.

[6] The Bank of England, in addition to being the main financial agent of the government, had many

government bonds, combined with an increase in the Bank of England's discount rate to the 5 per cent legal limit, meant that by 1720 the yield on long-term government bonds was approximately 1 1/2 percentage points lower than short-term commercial interest rates. Again, if market forces had been free to determine the term structure, instead of being restrained by the usury laws, it is likely that the inverted yield curve would have displayed an even greater negative slope. Long-term government bond yields remained above short-term interest rates for the rest of the century, although the gap narrowed significantly after 1770.

Table 2

British Real Interest Rates: 1700-1800

	Nominal Rate		Inflation	Real Rate	
	Long Term	Short Term		Long Term	Short Term
1700-10	10.0	4.5	0.6	9.4	3.9
1710-20	5.0	5.0	-1.8	6.8	6.8
1720-30	3.8	5.0	-0.7	4.5	5.7
1730-40	3.1	5.0	0.5	2.6	4.5
1740-50	3.2	5.0	-0.5	3.7	5.5
1750-60	3.1	5.0	0.3	2.8	4.7
1760-70	3.6	5.0	0.2	3.4	4.8
1770-80	3.8	5.0	1.0	2.8	4.0
1780-90	4.6	5.0	1.2	3.4	3.8
1790-99	4.5	5.0	5.5	-1.0	-0.5
Average:	4.5	5.0	0.6	3.8	4.3

Source:Homer, op. cit., pp. 156, 161-62, 165, and B. R. Mitchell and Phyllis Deane, Abstract of British Historical Statistics, (Cambridge: Cambridge University Press, 1962), pp. 468-69.

British interest rate developments during the 18th century can thus be summarized as follows. First, there was a general decline in the risk premium on government bonds, and by 1750 interest rates on long-term government bonds were lower than those on low-risk private loans such as mortgages. Second, there was a slight decline in the underlying real interest rate, from 5 per cent in the 1600s to about 4 per cent in the 18th century. Third, there was little variability in real interest rates: rates rarely deviated by more than 1/2 percentage points from the 4 per cent average level established in the 1720s. Fourth, the yield curve was again inverted, but was less negatively-sloped than during the early 17th century.

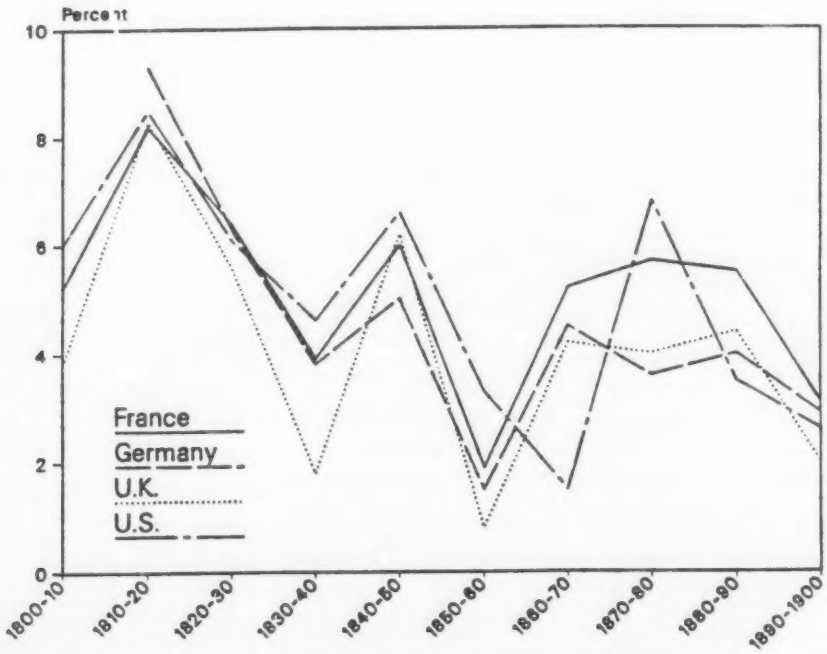
characteristics of a modern commercial bank. For instance, much of its revenue came from its practice of discounting private bills and making other commercial loans.

4. Interest Rate Developments in the 19th Century

A wealth of data on 19th century nominal interest-rate and price-level movements are available for most European countries, as well as the United States. The data suggest that despite the absence of modern communications technology, interest rates were remarkably synchronized among industrial countries during the 1800s (see Table 3). In particular, all industrial countries experienced a decline in nominal interest rates between 1800 and 1900, with most of this drop occurring during two distinct periods. The first major fall in nominal interest rates occurred during the twenty-year period following the end of the Napoleonic Wars, when interest rates on long-term bonds issued by European governments and the United States fell by an average of 1 1 2 percentage points. Long-term nominal interest rates remained nearly constant between 1840 and 1870, but declined by an additional 1 1 2 percentage points between 1880 and 1900.

The volatility of real interest rates during the 19th century stands in contrast to the smooth downward trend in nominal rates, as periods of high inflation were followed by periods of rapidly falling prices and led to sudden changes in real interest rates. Inflation led to real interest rates that were significantly lower than nominal rates between 1800 and 1810, and in the 1830s and 1850s. On the other hand, falling prices meant that real interest rates were above nominal rates between 1810 and 1830, as well as in the 1840s and 1880s. Nonetheless, there is evidence that the downward trend in nominal interest rates was ultimately reflected in lower real rates: real interest rates in Britain, France, Germany, and the United States were on average about 3 percentage points lower over the 1870-1900 period than between 1800 and 1830 (see Figure 1). Despite the decline in interest rates during the 19th century, British real interest rates averaged approximately 4 per cent between 1800 and 1900 -- the same level as during the preceding century.

Figure 1
Real Interest Rate Development in the United States and Selected European Countries, 1800-1900



As had been the case in Britain since the beginning of the 18th century, yield curves in the United States and most European countries were inverted during the first half of the 19th century. The downward slope of the yield curve was most pronounced in the United States, where short-term interest rates exceeded long-term government bond rates by between 4 and 5 percentage points during the 1830-60 period. The gap between short-term and long-term interest rates was much smaller in Britain and Germany, however, averaging only 0.3 percentage points between 1800 and 1850. France was unique among industrial countries in possessing an upward-sloping yield curve in the first decades of the century as uncertainty following the protracted upheavals of the French Revolution and the Napoleonic Wars resulted in a 3 percentage point interest premium on long-term government bonds compared to short-term securities. Although the rapid decline in long-term interest rates following the end of the Napoleonic Wars resulted in a flattening of the French yield curve, it did not revert to the downward slope of the previous century.

The period from 1850 to 1900 saw the end of the downward-sloping yield curve that had characterized the European term structure for nearly 150 years. In Germany, the steady flatten-

ing of a downward-sloping yield curve between 1810 and 1850 culminated in the emergence of a positively-sloped curve by 1860. Britain, on the other hand, experienced a widening of the gap between short-term and long-term rates before achieving, in the 1870s, the upward-sloping yield

Table 3

Interest Rates in Selected Industrial Countries, 1800-1900

Britain

Term	Nominal Rate		Inflation	Real Rate	
	Long Term	Short Term		Long Term	Short
1800-10	4.8	5.0	1.0	3.8	4.0
1810-20	4.6	4.9	-3.7	8.3	8.6
1820-30	3.7	4.0	-1.9	5.6	5.9
1830-40	3.4	3.6	1.6	1.8	2.0
1840-50	3.3	3.6	-2.9	6.2	6.5
1850-60	3.2	3.8	2.4	0.8	1.4
1860-70	3.3	4.2	-0.9	4.2	5.1
1870-80	3.2	3.0	-0.8	4.0	3.8
1880-90	2.8	2.6	-1.6	4.4	4.2
1890-99	2.5	2.1	0.5	2.0	1.6
Average:	3.5	3.7	-0.7	4.2	4.4

United States

Term	Nominal Rate		Inflation	Real Rate	
	Long Term	Short Term		Long Term	Short
1800-10	6.2	na	0.2	6.0	na
1810-20	6.4	na	-2.1	8.5	na
1820-30	4.6	na	-1.5	6.1	na
1830-40	5.0	10.6	0.4	4.6	10.2
1840-50	5.4	8.0	-1.2	6.6	9.2
1850-60	4.3	8.5	1.0	3.3	7.5
1860-70	5.3	7.1	3.8	1.5	3.3
1870-80	3.8	6.5	-3.0	6.8	9.5
1880-90	2.7	5.1	-0.8	3.5	5.9
1890-99	2.6	4.4	0.0	2.6	4.4
Average:	4.6	7.2	-0.3	4.9	7.5

Table 3 (con'd)

Interest Rates in Selected Industrial Countries, 1800-1900

Germany

	Nominal Rate		Inflation	Real Rate	
	Long Term	Short Term		Long Term	Short Term
1800-10	na	na	na	na	na
1810-20	5.5	6.3	-3.8	9.3	10.1
1820-30	4.9	5.1	-1.4	6.3	6.5
1830-40	4.1	4.3	0.3	3.8	4.0
1840-50	3.8	3.9	-1.2	5.0	5.1
1850-60	4.3	4.0	2.8	1.5	1.2
1860-70	4.3	3.8	-0.2	4.5	4.0
1870-80	4.2	4.1	-0.6	3.6	4.7
1880-90	4.0	3.0	0.0	4.0	3.0
1890-99	3.3	3.0	0.4	2.9	2.6
Average:	4.3	4.2	-0.4	4.7	4.6

France

	Nominal Rate		Inflation	Real Rate	
	Long Term	Short Term		Long Term	Short Term
1800-10	8.7	5.3	3.5	5.2	1.8
1810-20	7.3	4.5	-0.8	8.1	5.3
1820-30	4.8	4.0	-1.6	6.4	5.6
1830-40	4.3	4.0	0.4	3.9	3.6
1840-50	4.1	4.1	-1.9	6.0	6.0
1850-60	4.5	4.2	2.6	1.9	1.6
1860-70	4.4	3.7	-0.8	5.2	4.5
1870-80	4.7	3.7	-1.0	5.7	4.7
1880-90	3.7	2.9	-1.8	5.5	4.7
1890-99	3.0	2.3	-0.1	3.1	2.4
Average:	4.9	3.9	-0.2	5.1	4.0

Source: Homer, op. cit., pp. 222-23, 230-31, 259-61, 264-66, and B. R. Mitchell, European Historical Statistics: 1750-1970, (London: The MacMillan Press, 1975), pp. 736-38.

curve that has since been the norm. The United States was the only major industrial country not to have an upward-sloping yield curve during the 19th century: short-term rates averaged about 2 percentage points higher than long-term rates during the 1860-1900 period.

5. Interest Rates in the 20th Century

5.1 Movements in the Risk-Free Rate

Real interest rates have been more volatile in the 20th century than at any time since the 1500s, with shifts from one decade to another dwarfing movements that in the past required entire centuries. During the first decade of the 20th century, real interest rates remained at the same level as over the 1870-1900 period, as higher nominal interest rates were offset by increases in inflation. Nominal interest rates failed to keep pace with the surge in inflation associated with the First World War, however, resulting in negative real interest rates for most industrial countries. Although the end of the First World War brought a large decline in nominal interest rates, rapid deflation in the 1920s caused real rates to rebound sharply from their negative wartime levels, reaching heights that for several countries, including Canada, exceeded those of the 1980s. The main exception to high real interest rates in the 1920s was Germany, where hyperinflation resulted in a continuation of negative real rates.

A depression-induced collapse of investment was associated a decline in real interest rates during the 1930s -- real rates in some countries, including France and Japan, became negative during this decade, but in most countries they merely returned to the 4 to 5 per cent average level of the 19th century. As was the case in other major conflicts, real interest rates fell sharply during the Second World War, becoming negative in every major industrial country. The Second World War was somewhat unusual, however, in that a decline in nominal interest rates combined with higher inflation in generating low real rates. In previous large scale wars, such as the Napoleonic and First World Wars, the drop in real rates was entirely the result of higher inflation, which more than offset increases in nominal interest rates.

Table 4

Long-Term Interest Rates in Major Industrialized Countries, 1900-88

United States

	Nominal Rate	Inflation Rate	Real Rate
1900-10	3.5	2.3	1.2
1910-20	4.2	8.0	-3.8
1920-30	4.1	-1.8	5.9
1930-40	3.0	-1.7	4.7
1940-50	2.3	5.6	-3.3
1950-60	3.0	2.1	0.9
1960-70	4.5	2.8	1.7
1970-80	6.9	7.8	-0.9
1980-88	10.8	4.6	6.2
Average:	4.5	3.2	1.3

Britain

	Nominal Interest Rate	Inflation Rate	Real Interest Rate
1900-10	2.8	0.5	2.3
1910-20	3.8	10.2	-6.4
1920-30	4.6	-4.5	9.1
1930-40	3.5	1.5	2.0
1940-50	3.1	4.7	-1.6
1950-60	4.3	4.1	0.2
1960-70	6.5	4.0	2.5
1970-80	11.6	13.7	-2.1
1980-88	11.6	6.0	5.6
Average:	5.5	4.3	1.2

Table 4 (cont'd)

Long-Term Interest Rates in Major Industrialized Countries:1900-88

Canada

	Nominal Interest Rate	Inflation Rate	Real Interest Rate
1900-10	3.8	2.0	1.8
1910-20	4.8	7.6	-2.8
1920-30	5.1	-2.2	7.3
1930-40	3.9	-1.3	5.2
1940-50	2.9	4.6	-1.7
1950-60	3.7	2.2	1.5
1960-70	5.7	2.7	3.0
1970-80	8.9	8.0	0.9
1980-88	1.9	4.9	7.0
Average:	5.4	3.1	2.3

Japan

	Nominal Interest Rate	Inflation Rate	Real Interest Rate
1900-10	7.3	1.6	5.7
1910-20	6.2	11.1	-4.9
1920-30	7.1	-5.6	12.9
1930-40	5.0	5.2	-0.2
1940-50	4.2	31.4	-27.2
1950-60	7.0	4.0	2.9
1960-70	7.2	5.7	1.5
1970-80	7.8	9.0	-1.2
1980-88	6.7	1.9	4.8
Average:	6.4	7.1	-0.7

Table 4 (cont'd)

Long-Term Interest Rates in Major Industrialized Countries:1900-88

Germany

	Nominal Interest Rate	Inflation Rate	Real Interest Rate
1900-10	3.6	0.3	3.3
1910-20	4.7	27.3	-22.6
1920-30	7.3	154.0	-146.8
1930-40	6.3	-1.3	5.0
1940-50	4.7	1.5	3.2
1950-60	6.0	2.0	4.0
1960-70	6.6	0.4	6.2
1970-80	8.0	5.1	2.9
1980-88	7.6	2.6	5.0
Average:	5.9	21.3	-15.6

France

	Nominal Interest Rate	Inflation Rate	Real Interest Rate
1900-10	3.1	0.9	2.2
1910-20	4.1	-2.6	1.5
1920-30	5.2	0.5	4.7
1930-40	4.0	5.0	-1.0
1940-50	3.6	31.6	-28.1
1950-60	5.7	5.2	0.5
1960-70	5.4	2.5	2.9
1970-80	9.2	9.6	-0.4
1980-88	12.1	7.0	5.1
Average:	5.6	6.5	-0.9

Table 4 (cont'd)

Long-Term Interest Rates in Major Industrialized Countries:1900-88

Italy

	Nominal Interest Rate	Inflation Rate	Real Interest Rate
1900-10	4.9	1.8	3.1
1910-20	3.9	14.4	-10.5
1920-30	5.7	2.3	3.4
1930-40	4.7	2.2	2.5
1940-50	4.2	43.9	-39.7
1950-60	5.1	2.9	-2.2
1960-70	5.7	4.0	1.7
1970-80	11.4	14.0	-2.6
1980-88	14.9	10.7	4.2
Average:	6.4	10.5	-4.1

Source: Homer, op. cit., pp. 434-35, 470-71, 492-93, 532-33, 554-555; Thelma Liesner, Economic Statistics: 1900-1983, (New York: Facts on File Publications, 1985), pp. 23, 53, 77, 90, 103, 116; M.C. Urquhart, New Estimates of Gross National Product, Canada, 1870 to 1926: Some Implications for Canadian Development, Queen's University Institute for Economic Research Discussion Paper #586, (Kingston: Queen's University Institute for Economic Research, 1984), pp. 93-94; CANSIM, Series No. D 484000.

The post-World War Two period has been characterized by an upward trend in world nominal and (with the exception of the 1970s) real long-term interest rates. In the 1950s, real interest rates on long-term government bonds were close to zero in the United States, Canada, Britain, and France, and were negative in Japan and Italy. Higher nominal interest rates, unaccompanied by higher inflation, pushed real interest rates upward in the 1960s: real rates in Canada and the United States, for example, were about twice as high in the 1960s as in the 1950s. The surge in inflation that followed the 1973 oil price shock resulted, for most industrialized countries, in the lowest peacetime real interest rates of the century. The low real rates of the 1970s were reversed in the 1980s as the persistence of high nominal interest rates, despite the fall in inflation, led real interest rates to the highest level of the post-war period.

5.2 The Term Structure of Interest Rates during the 20th Century

Although many observers now regard the upward-sloping yield curve as representing the normal term structure, this positive relationship between the term of a loan and its interest rate

is of quite recent vintage. The yield curves of most European countries were downward sloping from the early 1700s until the mid-1800s, while in the United States, interest rates on short-term commercial paper exceeded those on long-term government bonds until the 1930s. Table 5 contains data on the yields of high-grade U.S. corporate and government bonds of various maturities over the 1900-88 period. The table shows the steady flattening of the downward-sloping yield curve during the first three decades of the 20th century and its sudden inversion in 1931. The gap between short-term and long-term interest rates continued to widen after 1931. In fact, by 1940, with long-term U.S. government bonds yielding 2.2 per cent, the interest rate on 1 year prime corporate bonds was 0.4 per cent, and the rate on 3 month Treasury Bills was a negligible 0.01 per cent.

The yield curve flattened during the Second World War, as short-term corporate interest rates rose unaccompanied by increases in long-term rates. Short-term bond rates averaged 1/2 percentage point less than long-term rates through the 1950s, and the gap narrowed further in the 1960s. The yield curve inverted briefly in the late 1960s, but regained its positive slope in 1971 and remained upward-sloping while nominal interest rates rose during the 1970s. Short-term rates again exceeded long-term rates over the 1979-81 period, but the yield curve reacquired a positive slope in 1982 and remained upward sloping through 1988.

Table 5

Interest Rates on High-Grade U.S. Corporate Securities, By Term to Maturity, 1900-88

	Term to Maturity		Term Premium
	1 Year	20 Years	
1900-09	4.0	3.6	-0.4
1910-19	4.5	4.2	-0.3
1920-28	5.0	4.7	-0.3
1929	5.3	4.5	-0.8
1930	4.4	4.4	0.0
1931	3.1	4.1	1.0
1932-39	1.6	3.4	1.8
1940-49	1.0	2.6	1.6
1950-59	2.5	3.1	0.6
1960-69	4.6	4.8	0.2
1970-79	6.9	7.8	0.9
1980-88	9.9	10.8	0.9

Source: Homer, op. cit., pp. 382-83 and the Federal Reserve Board, Federal Reserve Bulletin, various issues.

5.3 Risk Premiums

The early 20th century was characterized by a general decline in the interest premium on long-term corporate bonds compared with government securities (Table 6). In the late 19th century, interest rates on the highest quality U.S. corporate bonds, such as those issued by major railroads, exceeded rates on U.S. government bonds by an average of 40 per cent. By the second decade of the 20th century, however, corporate borrowers could obtain funds at an interest rate only 10 to 15 per cent higher than that paid on virtually default-free U.S. government bonds.

The gap between the interest rates on corporate and government bonds has been a reliable barometer of economic performance: periods of slow growth and uncertainty are typically associated with increases in the risk premium, while strong growth usually translates into a lower interest premium on corporate debt. The strong economic growth of the 1920s, for example, coincided with a decline in the risk premium. On the other hand, a fall in business confidence during the 1930s resulted in the risk premium reaching 22 per cent, its highest sustained level in the 20th century. Strong economic growth over the 1940-70 period was associated with a continued decline in the corporate risk premium. By the mid-1960s, the differential between U.S. corporate and government bonds had reached a record low of 5 per cent. The risk premium increased somewhat in the late 1960s, but remained below the levels observed in the 1940s and 1950s. The differential between interest rates on U.S. government bonds and those on corporate bonds increased sharply in 1970, and by 1971 stood at 26 per cent -- a level not observed since the 1930s. The risk premium remained high through 1975, fell to new lows during the late 1970s, and rose again to about 6.5 per cent during the recession of 1982-83. After dropping to an all-time low of 1.8 per cent in 1984, the premium increased, and since 1986 has averaged about 10 per cent.

Table 6

Nominal Interest Rate on U.S. Long-Term Corporate Bonds Versus U.S. Government Bond Rate, 1860-1988

	Interest Rate on Corporate Bonds (%)	U.S. Government (%) Bond Rate (%)	Risk Premium (%)
1860-69	5.9	5.3	10.5
1870-79	5.7	3.8	51.2
1880-89	4.0	2.7	47.6
1890-99	3.5	2.6	38.4
1900-09	3.5	1.8	94.4
1910-19	4.2	3.7	13.1
1920-29	4.6	4.1	11.5
1930-39	3.6	3.0	22.1
1940-49	2.6	2.3	13.0
1950-59	3.3	3.0	11.4
1960-69	4.9	4.5	9.5
1970-79	8.2	6.9	18.8
1980-88	11.6	10.8	7.4
Average:	4.9	4.0	26.7

Source: Homer, op. cit., pp. 287-88, 310, 343-44, 352-54, 361, and 362.

An alternative method for evaluating changes in risk is to compare the yields on long-term government bonds with returns on equity -- the sum of the dividend-price ratio and the rate of increase in stock prices. As shown in Table 7, although the return on equity has historically been higher than the interest rate on long-term government bonds, the level of this equity premium has varied significantly from decade to decade. In the late 19th century, for example, equity returns averaged only 3 percentage points higher than the interest rate on long-term government bonds. The premium declined to 0.3 percentage points during the 1910-20 period, but rebounded to 11 percentage points in the 1920s. The collapse of stock market prices in the 1930s resulted in a negative return on equity and hence a negative equity premium. The recovery of stock prices in the 1940s and 1950s caused the return on equity to far exceed the yield on bonds: the equity premium rose from 8.3 percentage points in the 1940s to a record 13 percentage points in the 1950s. Lower equity returns, combined with higher nominal interest rates, led to declines in the equity premium over the 1960-80 period: stock returns averaged 3 percentage points higher than bond yields in the 1960s, and just 1 percentage points higher in the 1970s. The 4 percentage

point equity premium observed in the 1980s, while higher than in the two previous decades, represents a return to the average premium that has prevailed since the 1870s.

Table 7

Average Return on Equity Versus Interest Rates on Long-Term Government Bonds, Canada and the United States

United States

	Return on Equity (%)			Government Bond Rate (%)	Equity Premium (p.p)
	Dividend Yield	Capital Gain	Total Yield		
1870-79	5.9	1.2	7.1	3.7	3.4
1880-89	4.8	0.1	4.9	2.7	2.2
1890-99	4.1	1.5	5.6	2.5	3.1
1900-09	4.3	4.3	8.6	1.8	6.8
1910-19	5.6	-1.6	4.0	4.0	0.3
1920-29	5.3	10.2	11.4	4.1	11.4
1930-39	4.6	-6.3	-1.7	3.0	-4.7
1940-49	5.3	5.3	10.6	2.3	8.3
1950-59	4.8	11.2	16.2	3.0	13.0
1960-69	3.3	4.1	7.4	4.5	2.9
1970-79	4.1	4.0	8.1	6.9	1.2
1980-88	4.4	10.8	15.2	10.8	4.4
Average:	4.6	3.6	8.2	3.9	4.3

Canada

	Return on Equity (%)			Government Bond Rate (%)	Equity Premium
	Dividend Yield	Capital Gain	Total Yield		
1934-39	5.0	-0.1	4.9	4.8	0.1
1940-49	5.7	5.5	11.2	2.9	8.3
1950-59	4.5	6.3	10.8	3.7	7.1
1960-69	3.3	5.9	9.2	5.7	3.5
1970-79	4.0	8.8	12.8	8.9	3.9
1980-88	3.6	5.7	9.3	11.9	-2.6
Average:	3.9	5.2	9.1	5.6	4.2

Source: Bureau of the Census, Historical Statistics of the United States: 1789-1945, (Washington, D.C.: Bureau of the Census, 1949), pp. 280-81; Homer, op. cit., pp. 286-87, 344, 354, 362; Liesner, op. cit., p. 62; M.C. Urquhart and K.A.H. Buckley, 'Historical Statistics of Canada,' (Ottawa: Statistics Canada, 1983), Series 494, 489, 480; and Cansim Series No. B4237 and 4245.

5.4 The Real Interest Rate and the Economic Growth Rate

The relationship between the real interest rate and the real economic growth rate has important implications for the sustainability of public debt. In particular, if the real interest rate exceeds the real economic growth rate, and in the absence of a sufficiently large primary surplus, then the debt-GNP ratio may increase explosively. As shown in Table 8, the potential for instability in the public debt-GNP ratio was a general feature of the British and U.S. economies prior to the 20th century. The gap between real interest rates and the real economic growth rate was especially large prior to the Industrial Revolution: between 1700 and 1760, when real GNP in Britain was growing at an average annual rate of just 0.7 per cent, the real interest rate facing the British government was nearly 5 per cent. This differential became somewhat smaller between 1760 and 1800, but real interest rates still exceeded the real economic growth rate by an average of 3 percentage points in the 18th century.

The tendency for the real interest rate on long-term government bonds to exceed the real economic growth rate persisted in the 19th century. The average real interest rate on British consols was 4.2 per cent in the 19th century, versus a real GNP growth rate of 2.2 per cent. In the United States, the real interest rate on long-term government bonds exceeded the growth rate of real GNP by 1.7 percentage points.

The 20th century represents a sharp departure from the 18th and 19th century patterns regarding the relationship between the real interest rate and the real economic growth rate. In the United States, the decline in the average real interest rate to 1.3 per cent between 1900 and 1988, together with sustained economic growth, has meant that there have been only three decades in this century in which the debt-GNP ratio has been threatened with instability. The first of these periods occurred in the 1920s, when a deflation-induced rise in the real interest rate meant that the real interest rate on U.S. government bonds exceeded the economy's growth rate by more than 2 percentage points. A near cessation of economic growth in the 1930s, coupled with continued high real interest rates, cause the gap between the U.S real interest rate and the economic growth rate to widen to 4.6 percentage points. Lastly, the rise in real interest rates during the 1980s, after remaining below the real economic growth rate for four decades, has meant that the public debt-GNP ratio is again potentially unstable. Canada's experience has closely paralleled that of the United States.

Table 8

Relationship Between Real Interest Rate on Government Bonds and Real Economic Growth Rate, United States, Britain, and Canada

	Growth Rate of Real GNP	Real Interest Rate on Long-Term Govt. Bonds	Real Govt. Bond Rate - Real GNP Growth Rate
	18th Century		
	Britain		
1700-60	0.7	4.7	4.0
1760-80	0.7	3.1	2.4
1780-1800	1.3	1.2	-0.1
Average:	0.8	3.8	3.0
	19th Century		
	Britain		
1800-30	2.0	4.2	2.2
1830-40	2.3	1.8	-0.5
1840-50	1.8	6.2	4.4
1850-60	2.6	0.8	-1.8
1860-70	2.7	4.2	1.5
1870-80	2.0	4.0	2.0
1880-90	1.9	4.4	2.5
1890-1900	2.4	2.0	-0.4
Average:	2.2	4.2	2.0
	United States		
1800-10	2.8	6.0	3.2
1810-20	1.6	8.5	6.9
1820-30	2.5	6.1	3.6
1830-40	4.8	4.6	-0.2
1840-50	5.2	6.6	1.4
1850-60	4.8	3.3	-1.5
1860-70	0.6	1.5	0.9
1870-79	5.3	6.8	1.5
1880-89	3.3	3.5	0.2
1890-1900	4.0	2.6	-1.4
Average:	3.5	5.0	1.5

Table 8 (cont'd)

Relationship Between Real Interest Rate on Government Bonds and Real Economic Growth Rate, United States, Britain, and Canada

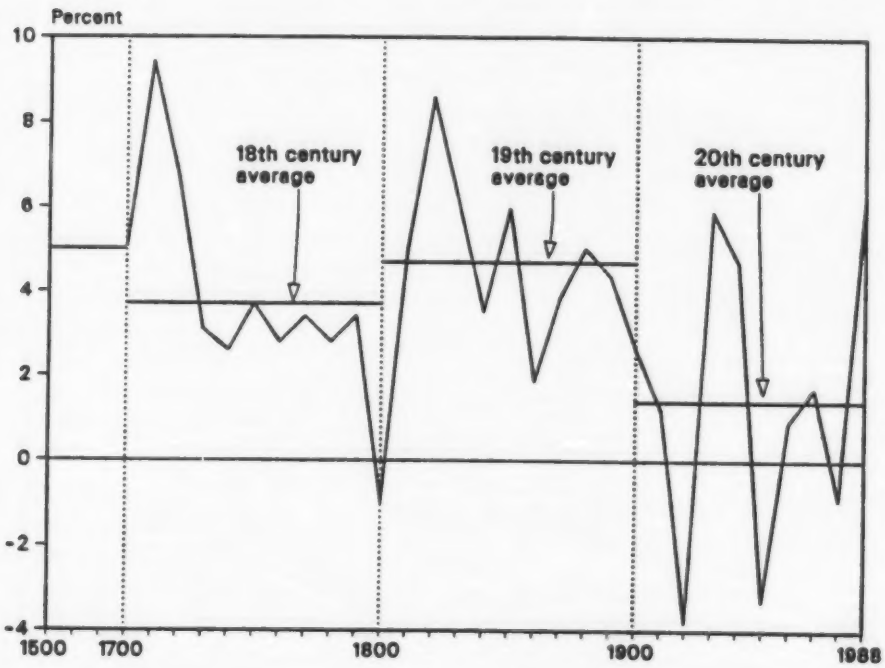
	Growth Rate of Real GNP	Real Interest Rate on Long-Term Govt. Bonds	Real Govt. Bond Rate - Real GNP Growth Rate
		20th Century	
		United States	
1900-09	3.7	-0.5	-4.2
1910-19	2.9	-5.1	-8.0
1920-29	3.6	5.9	2.3
1930-39	0.1	4.7	4.6
1940-49	4.4	-3.3	-7.7
1950-59	3.9	0.9	-3.0
1960-69	4.2	1.7	-2.5
1970-79	3.2	-0.9	-4.1
1980-88	3.0	6.2	3.2
Average:	3.2	0.9	-2.3
		Canada	
1900-09	5.9	1.8	-4.1
1910-19	2.8	-2.8	-5.6
1920-29	4.8	7.3	2.5
1930-39	0.5	5.2	4.7
1940-49	5.9	-1.7	-7.6
1950-59	5.1	1.5	-3.6
1960-69	5.2	3.0	-2.2
1970-79	4.6	0.9	-3.7
1980-88	3.0	7.0	4.0
Average:	4.1	2.3	-1.8

Source: N.F.R. Crafts, 'British Economic Growth, 1700-1831: A Review of the Evidence,' The Economic History Review, Second Series, Vol. XXXVI, No. 2. (May, 1983), pp. 177-99; Liesner, op. cit., p. 42; Phyllis Deane, 'New Estimates of Gross National Product for the United Kingdom, 1830-1914,' The Review of Income and Wealth, Series 14, No. 2, (June, 1968), pp. 95-112; Homer, op. cit., pp. 156, 161-62, 195-97, 286-88, 344, 354, 363, 492-93; International Monetary Fund, International Financial Statistics, various issues, Series c158__99a.r and c111__99a.r; Urquhart and Buckley, op. cit. Series 55; Urquhart, op. cit. pp. 93-94;

6. Concluding Remarks

Our analysis of world real interest rate developments since the 1500s has revealed their historical volatility (summarized in Figure 2). Movements in nominal interest rates have combined with rapid shifts in inflation to generate large swings in real rates. It is not uncommon, for example, to observe periods of high real rates, such as the 1930s, being followed by low rates, as in the 1940s. Historically, the main factor that has influenced the real interest rate is the inflation rate: large shifts in the inflation rate, such as those associated with wars, severe recession, or oil-price shocks, are usually only partially offset by changes in nominal interest rates, and thus translate into movements in the real rate.

Figure 2
World Real Interest Rates, 1500-1988



Despite the variability of real interest rates from one decade to the next, the underlying real rate -- that on low-risk investments such as private mortgages or government bonds -- has remained remarkably constant over long periods of time. The real interest rate on long-term government bonds averaged 5 per cent during both the 16th and 17th centuries, although the growing

sophistication of financial markets was associated with a slight decline in the underlying real interest rate, to about 4 per cent, during the 18th and 19th centuries. The 20th century, with its numerous bouts of inflation, represents a significant departure from the 4 to 5 per cent norm for the real interest rate established during the previous four centuries: real interest rates averaged less than 2 1/2 per cent in all industrial countries between 1900 and 1988, and for many countries were negative. Thus, although recent real interest rates are high compared with those observed since 1900, and especially since 1945, they are not unprecedented, and indeed are firmly within the boundaries of the peacetime fluctuations in the real rate observed during the last several centuries. To the extent that the real interest rate levels observed during the last 500 years indicate the 'natural' interest rate, one might expect that real interest rates will revert to somewhat lower levels. This may not eliminate the potential for instability in the public debt-GNP ratio, however, as the real interest rate on long-term government bonds has for long periods exceeded the real economic growth rate.

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